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PROGRESS REPORT

ON

SHORT-TERM FORECASTING AND OUTLOOK

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I. INTRODUCTION

1. For the past two years after the last joint Conference of African Planners, Statisticians and Demographers, the ECA secretariat has been involved in a series of activities relating to short-term forecasting structural adjustment programmes and other related socio-economic research and policy. By the early 1970s, Africa started to experience a number of economic disequilibria which have become progressively aggravated ever since, so much so that as from the early 1980s the African region as a whole has been in deep and protracted recession which has resulted in a serious social and economic crisis. This situation forced a number of African countries to embark on stabilization and structural adjustment programmes with the encouragement and support of International Monetary Fund (IMF) and the World Bank. Thus, during the period 1980-1989, as many as thirty-three African countries had put in place stabilization programmes under the stand-by arrangement facility of the IMF while 15 countries had structural adjustment programmes under the structural adjustment loans of the World Bank. However, the results so far achieved in most of these countries were not encouraging.

2. In its part, the ECA secretariat has continued to advise and propose to African countries models for short-term forecasting and the African alternative framework for structural adjustment programmes for socio-economic transformation of the African economies. This short paper briefly reports the main activities in short-term forecasting, structural adjustment and other related issues, namely world link outlook activities.

II. SHORT-TERM FORECASTING MODELS

3. After Rwanda and Mauritius, the SAM-based short-term forecasting model is presently being implemented in Congo. Following an expert mission realized in 1987 during which a short-term forecasting model was built on the basis of the peculiarities of the Congolese economy, the second step relating to the implementation of the model into computer was retarded because of the lack of PC computer facilities in the Forecasting Department of the Ministry of Planning and Economic Development. In the subsequent years, the government took steps to acquire a PC MICRAL 60. A large computer facility HP-3000 U48 has already been installed at the Calculus Center of the Ministry of Planning and Economic Development. The ECA experts will meet some time early 1990 with the Congolese counterparts to study and implement the two Congolese models - one short-term forecasting model and one medium-term development model - into the computer facilities so that the simulation works based on the various government development and adjustment policies can be strengthened.

4. Similarly, the Mauritius government has acquired PC microcomputers and the forecasting activities initiated three years ago by ECA and which was temporarily stopped because of the lack of appropriate computer facilities will soon be reactivated, so that the day-to-day simulation activities can be promoted in order to strengthen the planning and structural adjustment capability of the government. In Rwanda, the work

on the short-term forecasting is in advanced stage thanks to technical assistance of the West German which affected an expert to the Ministry of Planning to take up what ECA had built and to the government in the day-to-day simulation of the economic activities of the country. The Rwandese government has already sent two of its experts at the ECA headquarters to get acquainted with the ECA short-term forecasting activities and computer facilities as well as ECA socio-economic research programmes.

III. SHORT-TERM STRUCTURAL ADJUSTMENT PROGRAMMES

5. Some 33 African countries, accounting for more than three-fourths of Africa's population and GDP are implementing major programmes of structural reforms and, in most cases, under the financial and technical assistance of the IMF and the World Bank. These reforms programmes cover a wide array of measures designed to devalue real effective exchange rates, increase agricultural incentives, continue budgetary and monetary restraint, reform public enterprises and reduce the size of public investment programmes while improving the allocation of public funds to sound, high-priority programmes. The depth of these reforms and the persistence of policy makers in implementing them are major achievements of African governments.

6. However, despite all these efforts, the institutional and political difficulties, the social costs and the financial requirements to sustain such an adjustment process are mounting and, in most African countries undertaking such programmes, the social and economic conditions have continued to deteriorate rather than improve. These even were signs that resistance to further reforms is hardening, especially in the face of stagnating or declining per capita consumption.

7. Hence, the ECA secretariat has embarked into a search for an alternative to a structural adjustment programme which will bring about the transformation of the African economies as a part of a process - a process for finding the ways and means of reversing the deterioration in the African economies which has been going on now for more than a decade and installing in its place self-sustained and sustainable development. It was indeed such concerns and apprehensions, together with the need to reestablish a process of recovery and renewed growth and development that provided an impetus for the adoption of the "African Alternative Framework to Structural Adjustment Programmes for Socio-economic Recovery and Transformation" (AAF-SAP), by the Ministers responsible of economic development and social planning and the Ministers of finances. The AAF-SAP was endorsed by the African Heads of State and Government at the OAU Summit last July 1989, and, recently, by the UN General Assembly in its resolution A/44/L.20/Rev.1, as the basis for mapping out African countries' development strategy.

8. The African Alternative Framework centred principally on the need to link economic, social and political issues, reconcile short-term forecasting with the long-term perspectives and focuses on domestic as well as international policy issues in certain specific areas. The strategy recognized the need to build a model that link short-term concerns with long-term development objectives. The ECA secretariat embarked in building a macro-economic model and in amplifying the various alternative policy instruments and measures which are detailed in two of your documents (see E/ECA/PSD.6/ 7) and E/ECA/PSD.6/ 8).

9. The momentum of the African Alternative Framework to Structural Adjustment for Socio-economic Recovery and Transformation is in full gear. The ECA has already initiated three main studies relating to an in-depth analysis of some of the policy instruments of AAF-SAP, namely (1) production subsidies for sustainable growth, (2) scope and limitation for differential interest rates, (3) possibilities and problems of multiple exchange rate systems. ECA is planning a pilot subregional workshop on AAF-SAP for the governments of West African subregion at the request of Mali, the Gambia, Liberia and Ghana in order to assist countries in formulating adjustment programmes. The ECA secretariat has participated in the workshop on the structural adjustment programmes organized by the governments of Lesotho and Uganda, during which the AAF-SAP proposals were explained in order illucidate the adjustment process with transformation. A macro-economic model that fits the characteristics of the Lesotho economy was proposed, which could be used further to simulate the various alternatives policy mixes of the government development programmes.

IV. WORLD LINK OUTLOOK ACTIVITIES

10. The World Project Link Conference was held in Paris (France) at the Institut de Statistiques et d'Etudes Economiques (INSEE) from 28 August to 2 September 1989. More than 60 participants coming from all the regions of the world - Europe, North America, Latin America, Asia and Africa - attended the meeting. The ECA was represented (see in annex UNECA contribution). The purpose of this fall meeting was to review and assess the various country and global outlooks and to seek means and ways of incorporating them in the overall world Link Project. It was announced at this meeting that the Project will move now from the University of Pennsylvania Center to the United Nations Secretariat (Department of International Economic and Social Affairs, DIESA), but the university of Pennsylvania Center will continue to ensure the technical functioning of the Project.

11. Indeed, over the past 15 years, the world economic system has been going through a programme of major adjustments brought on by the continued weakening of the US dollar, volatile interest rates, roller coaster oil prices, plus various forms of floating and managed foreign exchange rate. Continued adjustments since the international Conference in December 1971, which attempted to realign

the foreign exchange value of the major currencies, have on the whole proved to be detrimental to world economic growth. The financial markets of the major countries of the world are linked together through the increasing use of interest rate swaps, currency options, interest rate options, and financial future markets and those factors contribute to the globalization of finance. That the world is shrinking is also evidenced in the amazing speed with which the international telecommunications industry has developed. Linked to this development is the standardization of computer technology and computer system languages around the world, allowing microstaneous transmission of a large volume of complex and adverse transactions in the financial world. Another factor that has hurled the world headlong into the 21st century of global finance is the outbreak of the debt crisis in the developing countries in 1982 and the volatility of world oil prices from 1973 to the present. The international debt crises has forced the integration of the major national markets of the world into a single world financial market, operating at break-neck speeds on a never-closed basis.

12. Adverse economic conditions can and have thrown the world into financial chaos during the 1930s. A major part of the problem is the movement of surplus investment funds being misallocated into medium and long-term debt structures of developing nations to settle what appeared to be short-term balance of payments crises due to oil and other external shocks to the exclusion of structural factors. The integration of world financial markets ripple these shocks through the global community without any reduction in force. International debt renegotiations and new loans need to be rechanneled into restoring economic growth among the developing nations, to improve their position as debtor nations, and to more closely weave them into the basic elements of global finance. Although no known method of assessing national risk is foolproof, the globalization of financial markets sorts out a myriad of economic and political data, basing decisions on a market structured approach to assist in subjective evaluations of a particular country's economic potential. The placement of the surplus investment funds of Japan, W. Germany, Switzerland, the United Kingdom and others in "real property" over the past few years is indeed encouraging, showing the return to investment for the future, not speculation on the future.

13. The Department of Economics of the University of Pennsylvania and the United Nations Department of International Economic and Social Affairs have jointly made outlook forecasts for several countries in the world up to the year 1993 using several well-defined appropriate macro-economic models for individual regions: Developed market economies, Latin America, Africa, Middle East, Asia and Centrally Planned Economies. The African countries which are included in this outlook exercise and for which data on pertinent variables of the model is available include Algeria, Egypt, Ethiopia, Gabon, Ghana Kenya, Libya, Morocco, Nigeria, Sudan, Tunisia, including African Least Developed Countries as a group. The process of the transfer of these models to the UNECA headquarters has already been launched. The next meeting of the meeting of the World Link Project, scheduled to be held in New York in March 1990, will determine the technical modalities of Link of the various forecasting models to the Headquarters and the exchange of information thereoff. The UN/DIESA GDP forecasts for African countries are as follows:

World Project Link - UN/DIESA Post Meeting Forecasts Fall 1989-GDP growth rate in percent

Country	1987 billion local currency	1988	1989	1990	1991	1992	1993
Algeria	104 823	-1.0	2.9	3.4	2.8	3.0	3.3
Egypt	19 330	2.2	2.6	2.4	3.6	3.6	3.2
Ethiopia	7 664	-0.9	5.4	3.1	2.8	3.2	3.1
Gabon	375	0.2	2.2	2.4	4.0	3.4	3.1
Ghana	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Kenya	40 222	3.5	2.9	3.2	4.0	3.5	3.7
Libyan Arab Jamahiriya	6 150	0.7	1.7	1.7	2.8	2.7	2.4
Morocco	84 591	6.2	3.5	4.4	3.2	3.6	4.4
Nigeria	20 450	4.0	2.7	1.5	2.0	3.2	3.5
Sudan	2 399	-1.5	-3.6	3.6	3.0	3.5	3.6
Tunisia	3 247	0.3	5.6	3.7	4.1	3.1	3.9
Other African countries a/	33 284	3.3	3.1	3.0	2.8	3.1	2.3
African LDCs b	14 161	3.4	3.1	2.7	2.9	2.6	2.9

Source: DIESA.

a/ Including Angola, Congo, Cote d'Ivoire, Liberia, Madagascar, Mauritania, Mauritius, Mozambique, Reunion, Senegal, Seychelles, Sierra Leone, Zimbabwe, Togo, Cameroon, Zaire, Zambia.

b/ Including Benin, Botswana, Burundi, Central African Republic, Chad, Gambia, Malawi, Mali, Niger.

n.a = not available.

V. CONCLUSION

14. The presently ECA short-term forecasting activities consist of reviewing structural adjustment programmes with particular emphasis to re-orienting such programmes to meet the development objectives and to center them on the human dimension. After a theoretical framework at the continental level, the ECA intends to establish a solid empirical basis for designing a more viable alternative adjustment approach at each individual African country. The ECA secretariat would be central in operationalizing AAF-SAP in individual African countries, in the different subregions and at the regional level. The financial support of UNDP and other donors will be crucial for the realization of the operational phase of AAF-SAP. Short-term forecasting models and outlook will be integrated in such AAF-SAP activities.

ANNEX I

MODELLING ECONOMIC DEVELOPMENT IN AFRICA: ECA RESEARCH ACTIVITIES

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MODELLING ECONOMIC DEVELOPMENT IN AFRICA

For the past ten years or so, the ECA secretariat has been heavily engaged in a series of programmes aiming at building development planning models with the sole objective of mapping a future outlook for the African economies. In this context, quite a number of studies were carried out to help the African countries in the formulation of economic strategies and policies within a coherent and consistent national development plan by indicating the policy implications under various alternative development scenarios. This short paper briefly reviews the ECA activities in this area and pinpoints the problems and constraints that arise in the development of the planning models in the African region and the perspectives of Africa's development in 1990-2000.

A. HISTORICAL BACKGROUND

1. Macro-economic modelling of African economies

First, the ECA secretariat started with the creation of the macro-economic projection models which were based on the broad national account data. These models attempted to describe the relationship between the structure of production, the distribution of value added, the consumption, saving and investment, and the external trade (imports and exports). It was the usual two gap model analysis.1/ These models were completed in 1980 and submitted to the first session of the Joint Conference of African Planners, Statisticians and Demographers in March 1980. Various critics were made on these models, among which were that (a) these models were too broad to adequately estimate the structural and behavioural parameters which were the most challenging in several African countries;(b) the choice of national account statistics does not exhaustively relate the dynamics of socio-economic changes and the basic social and cultural relationships concerning development;and (c) the role of population and other socio-economic and cultural variables in the development process was not explicitly expressed in the models. Hence, recommendations were made to supplement these macro- and long-term models by multi-sectoral development planning analysis, taking into account the above comments

2. Multi-sectoral development planning models

Pursuant to these recommendations, the ECA secretariat undertook a study on sectoral output and employment planning on the basis of the two path-breaking method The first was the Keynesian method of visualizing a national economy through a system of national accounts. However, account was taken here on the problems of consistency and interaction between diverse economic activities like production, consumption, saving and investment and to link these activities with government policies. The second method was to bring into the picture the other side of the economic machinery:the structure of prodcution. This aspect was ignored by Keynes because the developed countries which Keynes had as a reference point had already a well-defined production structure where in normal cases most of the production structure was thus considered irrelevant for government policy formulation. In developing countries, however, the analysis of production structure can help to provide a comprehensive picture of the sectoral ramification of the problems of development in these countries. Leontief was the first to show that an economic system can indeed have a well-defined production structure which can be interacted with itself and with the final demand structure.

The study on sectoral output and employment planning was based on the combination of these two economic concepts and was carried out under various methodological approaches with the view to taking account of the peculiarities of the different economic practices in Africa. 2/ As such disaggregative type of analysis generally entails extensive data collection, the exercise was first confined to six countries only.

The first methodology described the closed growth model in which sectoral value added was determined from a structure of sectoral investment allocation and from sectoral capital coefficients. 3/ The model which distinguished two categories of sectors (consumption goods and capital goods), had been applied to Ethiopian economy for an analysis of a scenario of self-sustained growth. The second analytical tool related to a desaggregated macro-economic model in which the principal socio economic activities were detailed in econometric relationships so as to determine their impact on the economy as a whole. Such an approach was used for analyzing and planning those African economies where intersectoral relations were not recorded like in Benin to which the model had been applied.

The third approach developed by the ECA secretariat was the static input-output model where sectoral gross outputs were determined from sectoral final demand which, in turn, was obtained by use of econometric techniques. The application of this analytical tool to Algeria had shown that it could constitute a valuable approach to sectoral elaboration of a development plan as well as for sectoral production and employment policies. The fourth approach, which is the second variant of the the third model, is a model which had an interaction between final demand and production which were determined simultaneously rather than independently of each other. This approach had been used to analyse the revised development plan of Kenya for 1979-1983. The fifth approach is the dynamic input-output model that was developed for Nigeria on the basis of certain assumptions contained in its fourth development plan. The interesting aspect of this analytical tool was that investment was no more exogeneous but determined at the same time as gross sectoral production and employment.

The sixth and last approach attempts to specify a number of real production sector for which an input-output table exists, plus one additional sector for the allocation of investment in the form of equipment and machinery produced by the different sectors. The policy implications can be generated through the changes in values of exogenous variables such as prices of imported goods, total investment expansion in a given period, population growth, and export growth rates and how these changes affect the endogenous variables or through the simulation of structural changes and its impact on the pattern of growth. Structural changes are made on consumption patterns through changes in consumption elasticities, cross-price elasticities population growth rates, etc. This last model, in contrast of the preceding ones, presented the advantages of taking into account the population variable and cultural variables for determination of consumption patterns and had been applied to Morocco on an experimental basis.

All these approaches have been submitted to the second ECA Joint Conference of African Planners, Statisticians and Demographers in March 1982. The comments received from this conference concentrated mainly on the need to incorporate into these multi-sectoral models the analysis of the informal sector and its interaction with the formal sector, the treatment of price and balance of payments variables, the need to initiate the dynamization of the input-output coefficients and the introduction of the energy sector, for improved energy balance in Africa. In addition, it was felt that there was need to complement these long-term multi-sectoral models with short-term forecasting models since many African countries were facing various short-term economic problems and deviations resulting from the 1973 and 1979 world recessions. These forecasting models should enable planners to devise appropriate adjustment measures to internal economic fluctuations while continuing to pursue their long-term objectives and strategies contained in their respective national development plans. In view of the nature of the technicalities of the subjects proposed by the Joint Conference to improve multi-sectoral development modelling, the ECA secretariat dedicated the study of these topics to a technical workshop of experts in order to allow for the African planners to have a deep insight of the problems involved. In the meanwhile, the ECA secretariat had embarked in the building of short-term forecasting models based on a social accounting matrix (SAM) 4/ and in the critically analyzing the problems and crises that were currently beating the African continent. 5/

3. SAM-based short-term forecasting models

The need for SAM-Based forecasting models in Africa was straightforward. In effect, existing national accounting systems such as the United Nations system of national accounts, the French national account system, the European national ccounting system of EEC, material balancing in the Soviet Union, etc. on which some of our previous models were developed focus on the production of goods and services and their utilization as well as the growth aspect of the economies they describe. However, recent trends in African economies have showed the seriousness of problems concerned with satisfying basic needs in education, employment, health, food and water as well as problems relating to identifying industries and social groups. It, therefore, became absolutely necessary to design a means of quantitatively describing economies which simultaneously involve (a) the production of goods and services and the use of such goods and services, especially production structure; (b) income generation, distribution and use. The introduction of social accounting matrix was designed to solve some of these problems. There is a complementarity between SAMs and the prevailing acounting systems in the sense that SAMs involve a fine disaggregation of different accounts such as production as well as institution sectors.

The short-term forecasting exercise was originally conceived to progressively cover all the African countries within a 4 to 5 years period. However, during the two-year pilot period, only eight countries had been selected according to their various economic structure and regional representation, namely Cameroon, Egypt, Ethiopia, Cote d'Ivoire, Rwanda, Sudan, Zaire and Zimbabwe. Four of these countries had agreed to a preliminary mission of

ECA experts, two countries requested for the immediate establishment of short-term SAM-based models in their countries (Rwanda and Mauritius where these models are currently in operation in their major computer facilities).

The difficulty in installing this tool in the African countries lies in (a) the fact that SAM imposes substantial data demand and human and financial resources for data collection, processing and retrieval although it remains a relatively flexible system (b) the need for household surveys and censuses of production for full construction and implementation of a SAM and the need for an institutional machinery to coordinate short-term forecasting activities at the country level; and (c) the need to create the national capabilities to manage these computable general equilibrium models.

The progress report for the implementation of SAM-based forecasting models was presented at the third session of the Joint Conference of the African Planners, Statisticians and Demographers in March 1984. 6/ The comments received by the planners centered on the insufficiency and lack of data as major constraints which, in most cases, do not allow for easy estimation of the parameters needed for handling these general equilibrium models, the insufficient skilled manpower resources, the classification difficulties due to the existence of mixed activities on the main production sectors. With regard to the creation and the reinforcing of the national capabilities for short-term forecasting some African planners proposed that some government officials could be sent to ECA to be acquainted with construction of SAM, as well as the handling of the models and the treatment of data on the computer. This requires efforts on the part of the countries to identify some qualified government officials for training and the commiting of financial resources to cover the costs of travel and subsistence. 7/

In the pursuit of this training activity and conformly to the recommendation of the second ECA joint Conference of African Planners, Statisticians and Demographers, the ECA secretariat organized a workshop on "Multi-secotral Planning Models and Short-term Economic Forecasting for Policy Design in Development Planning and Management in African Countries" which was held in Moscow (USSR) from 15 to 28 September 1986 with the assistance of the Central Economics and Mathematical Institute of lthe USSR Academy of Science (CEMI-As-USSR). The workshop was attended by the representatives of 15 selected countries (Algeria, Benin, Burundi, Congo, Egypt, Ethiopia, Ghana, Kenya, Mauritius, Morocco, Rwanda, Senegal, Tanzania, Togo, and Zambia), the organizations of the UN system (DIESA, ILO, UNCTAD, UNIDO, UNECA), and the experts and professors from the USSR Academy of Science.

The Moscow seminar in its deliberations recommended that (1) positive measures should be taken to integrate the informal sector in the modelling of the development planning process (2) the fact that the developing African countries are facing greater uncertainties due mainly to exogenous shocks of fluctuations in commodity prices, climatic conditions, political and social instability, etc. calls for the need to devise and implement short-term forecasting models which integrate the various financial, price and balance-of-payments variables and which could enable African planners decision-makers

and scholars to analyse and monitor the evolution of their economies and to make the necessary timely adjustments;(3) efforts should be made to organize African data system into the social accounting matrix (SAM) which was regarded by the seminarists as a powerful tool for economic analysis and forecasting atboth micro- and macro-levels and those relating to intersectoral balances (input-output technical coefficients and their dynamization) and (4) modelling of the energy sector should constitute an integral part of the economic and social development planning activities.

ECA endeavoured in the study of these recommended issues and the respective technical papers were presented at the fourth and fifth sessions of the Joint Conference of African Planners, Statisticians and Demographers in 1986 and 1988, respectively. 3/ In addition, efforts were made to incorporate in these development models the dimension of the subregional economic co-operation and integration among African countries countries. 9/ The ECA also published every year a Survey of Economic and Social Conditions in Africa and an Economic Report for Africa which give the economic trends of the region and the economic outlook for the next two years ahead.

It is generally recognized that the fundamental aim of development is the improvement of the quality of life of every individual and that of all the population as a whole. Achievement of such goals would require integrated planning covering all aspects of social and economic life such education, health, nutrition, employment, housing, etc. Considering the importance placed on the welfare of individuals and population as a whole demographic factors must be considered as necessary elements of development planning. The integration of population variables in development policies and plans had been slow in most African countries due to such factors as inadequate understanding of the population-development inter-relationships, lack of recognition of population as an important variable in development, data constraints associated with the non-availability of trained nationals to handle population variables in planning, the absence of adequately developed institutional framework in the population planning process and the lack of well developed methodologies for the integration of population in development planning. The first concern of several developing African countries when they gained their independence was to undertake programmes aimed at improving the lot of people through the expansion of gross domestic product (GDP) and employment without even considering the ultimate affects of such expansion on the people through a more equitable distribution of proceeds of economic growth.

This is why ECA has moved to SAM-based planning models methods which take into account not only the growth process, but also the distribution of that growth among social groups. This method has been successfully implemented in Rwanda where in so-called UMUGAMBA scheme population takes effectively a major place in the development process of the country.

All these development models were designed without fully taking into account the global economy, or, except for trade and balance of payments variables, the influences of the other external factors on the African economies were not thoroughly examined, presumably because of the lack of readily available data of the world economy at the African countries' disposal. The aim to integrate the African development modelling exercise into the world economy for better economic outlook is presently the main preoccupation of the ECA and DIESA. In this regard the cooperation between ECA and DIESA in the world project LINK is being strengthened to the benefit of both the African countries and the world economy. 10/

B. PERSPECTIVES OF AFRICA'S DEVELOPMENT IN 1990-2000

It should be recalled that African Heads of the State and Government have adopted in 1980 the Lagos Plan of Action for the Economic and Social Development of Africa, 1980-2000 which, for the first time, formulated long-term strategies for Africa's development based on self-sustainment and self-reliance. 11/ However, in the years that followed the adoption of the LPA, the African economies experienced a serious socio-economic crisis which was caused by both endogenous and exogenous factors. The external environment was particularly hostile, with increased protectionism, rapid advancements in scientific and technological development all of which hastened the process of product substitution, especially synthetics for raw materials, and the intensification of bilateralism at the expense of multilateralism. Africa's terms of trade deteriorated rapidly the primary export commodity prices declined sharply compared to high import prices of manufactured goods and oil. Recovery in the developed countries has not been transmitted to the developing African countries due to inherent weakness in institutional factors governing market specialization, patent and technology diffusion, and the international deivision of labour and decision-making process. In the wake of the technological leaps in space and nuclear energy and telecommunications revolution in the 1980s, Africa lagged behind technologically and economically. Its prones to natural clamities and external dependence increased and exacerbated. The two exogenous factors - external environment and natural calamities - have interacted in various forms to deepen the crisis facing African economies, with the severe deflationary impact of world's recession during 1980-1982, the great Africandrought of 1983-1985, the collapse of commodity markets in 1986, escalating debt burden and declining real resource flows, the return to drought in 1987 and incidence of natural calanities such as floods, cyclones, locus and grasshoper infestation, etc. Hence, the priority for many African countries has centred more and more on cheer survival rather than on development.

While the developed countries made massive additions to their capital formation both quantitatively and qualitatively, the rate of investment in Africa fell continuously during the 1980s with insignificant additions to capital stocks accumulated in the 1970s. Hence, in many respect, the performance of the African economy was far from satisfactory in the 1980s. The average rate of growth of total regional output decelerated considerably from its 1970s average level of 5.2 per cent to only 1.5 per cent in the 1980s (less than the population growth rate of about 3.1 per cent annually), far below the target

of 7 per cent postulated in the Lagos Plan of Action and in the Third United Nations Development Decade. By 1988, per capita GDP fell to 80 per cent of what it was in 1980. A large number of individual African countries in fact recorded only negative average rates of growth during the decade.

The performance of food and agricultural sector was particularly unimpressive, linked as it is to unfavourable climatic conditions, adverse external factors (fall in agricultural export prices) as well as a pervasive technological ackwardness that continued to prevail during the decade. The performance of the industrial sector was equally unimpressive. Production was confined to a few lines of production of consumption goods, while the intermediate and capital goods subsectors remained weak or even virtually non-existent in many countries. The import content of manufacturing was high, while productivity remained low. Inadequate skills and technical capabilities, management weaknesses, shortages of raw materials and spare-parts continued weaken the productive capacity to expand and grow. Similarly, the sectors in support of agriculture and industry, namely transport, trade, and services, were adversely affected by overall economic decline.

The African governments have hence struggled to reverse the continuing decline in growth of per capita income. They adopted medium-term regional programmes such as "The Africa's Priority Programme for Economic REcovery 1986-1990" (APPER) and the United Nations Programme of Action for Economic Recovery and Development (UNPAAERD) which was supported by the international community at the special session of the UN General Assembly in June 1986. 12 / These programmes attempted to reverse the early development strategy of import-substitution industrialization as the engine of economic growth in Africa and put rather more emphasis on the agricultural sector as a source of economic recovery and growth. However, despite the adoption and implementation of the measures contained in these programmes, the economy of Africa did not improve significantly. The region's total debt obligations have increased instead by 32 per cent in 1988 reaching US$230 billion compared to US$174 billion in 1985 and debt overhang has forced many African countries to adopt severe stabilization, retrenchment and adjustment policies and programmes, often sponsored by IMF and the World Bank.

However, the stabilization and structural adjustment programmes have not succeeded in resolving Africa's development impasse. On the contrary, these programmes entailed considerable political risks and their focus on temporary fiscal and monetary inbalances to the exclusion of the structural issues and problems that are fundamental to the transformation and restructuring of the African economies has not solved the problem of the real and basic needs of the African population in terms of access to basic commodities and services such as food, primary health care, education and employment. Equally problematic was the financial liability entailed in those programmes, as additional loans at hard terms and conditonalities are required merely to service existing loans.

It has become clear that at almost the end of the decade, the objectives of the Third United Nations Development Decade and the Lagos Plan of Action have been far from adequately achieved in several African countries, as Africa was yet to set in motion the process of self-sustainment development and structural transformation.

The lessons that Africa has learnt from this preceding course of development are varied from country to country and wide. However, the presence and persistence of a crisis situation exacerbated by inherent structural deficiencies and weaknesses remains a major cause of concern despite the major policy reforms of various types initiated in the past three decades. Indeed, the fragile structural characteristics and physical limitations of the African region have been the very cause of its stagnation and economic instability and the same factors will continue to frustrate Africa's development unless they are adequately addressed, in addition to already mentioned exogenous factors such as the weather and the international environment.

It was indeed such concerns and apprehensions, together with the need to reestablish a process of recovery and renewed growth and development that provided an impetus for the adoption of the "African Alternative Framework to Structural Adjustment Programmes for Socio-Economic Recovery and Transformation (E/ECA/CM.15/6/Rev.3) by the Ministers responsible of economic development and social planning and the ministers of finances. The programme was endorsed by the African Heads of State and Government at the OAU Summit las July 1989.

The African Alternative Framework centered principally on the need to link economic, social and political issues. reconcile short-term perspectives with the long-ern perspectives and focuses on domestic as well as international policy issues in certain specific areas. The strategy recognized that the ultimate responsibility for development rested primarily on the African countries themselves, but that a clear commitment was required on the part of the developed countries to support their endeavours through policies aired at improving the international economic and political environment and conductive to development, and through international co-operation designed to bridge the socio-economic gaps between the developing and developed countries.

Within this startling reality that has in part led to a rethinking and some fine-turning of Africa's development strategies in the context of the current approach to structural adjustment programmes that the Economic Commission for Africa (ECA) has revised its early perspective study for the 1990s in Africa into the new title "Beyond Recovery: ECA's Revised Perspectives of Africa's Development 1988-2008". It is argued in this study that if Africa is to overcome its short- to medium-term problems and re-establish the basis for sustainable growth in the long-run, the following areas of concern have to be seriously and urgently addressed in the 1990s:

1) Demographic concerns

The current economic and social crises in the African region is taking place in an environment characterized by rapid population growth and uneven population distribution, rapid rates of urbanization, massive unemployment, widening income disparities and progressive pauperization and immiserization

of the population, as population is growing on average at 3.1 per cent annually in Africa compared to 2 per cent in the developing countries as a whole. The resulting increase in demand for food will further distort resource allocation patterns, especially to the detriment of productive sectors' unemployment and underemployment will intensify' essential services such as education, health, transport and housing will deteriorate as they come under severe pressure with the limited resources;and widespread poverty and social unrest will become the norm in the 1990s.

2) The social welfare gap

Another emerging concern is widening gap between Africa and other developing regions in terms of the quality of life. Thus, the human beings should be the focus of development and there is need to promote universal education, health, housing, safe drinking water, hygenic food, adequate nutrition, eradication of endemic diseases, and the provision of services at affordable prices.

3) The human resource gap

Undeveloped and under-developed human resource is recognized as one of the instrumental factors in Africa's overall economic decline. Thus, the overall development concerns in the 1990s will not just be to close the human resource gap in terms of availability and effective rates of utilization, but also in terms of upgrading the quality of the human factors in development. For the full realization of the human factor as the motive force for changes, it is imperative that policies and strategies that aim at employment-oriented development, the deepening of skills and enhancement in productivity as the prime goal of socio-economic development must be initiated.

4) Environment concerns

In Africa, deforestation, soil degradation and desertification are the most serious environmental issues that threaten to cause permanent damage to eco-systems. Thus, the environment must be protected both to maintain natural wealth and its productivity, and to control the disastrous effects of environmental degradation on the lives of people and livestock.

5) The technological gap

Another development concern is the increasing technological gap between Africa and other developing regions of the World, not only in terms of the acquisition of technology, but also in terms and manner of internalizing, adapting and optimizing it. The crucial question is not that of transfer of technology, but the need to reverse the historical dependency relationship with the developed countries for certain types of technology that are generally inappropriate to the African needs. The study urged African countries to devote at least 1 to 2 per cent of their GDP to research and development with a view to upgrading traditional technology and blending it with new and advanced technology through a process of modification and adaptation of imported technology to suit local environmental conditions.

6) The International environment

As long as Africa remains part of an interdependent world, the attainment of the objectives of maximizing the economic and social welfare of its population will, to that extent, be dependent critically on and interrelated with developments in extra-African markets. Thus, one of the major concerns of the African region is the existence of an unjust and inequitable international economic order and the awkward position occupied by the region in the international division of labour and distribution of global wealth. Africa's increasing vulnerability and marginalization to the periphery of the periphery of the world economic system has all the more intensified rather than moderated in the 1980s, and the long-term prospects for the region's development are indeed bleak on the assumption of a continuation of the unfavourable development in the international commodity, and financial markets. Therefore, there is need for fundamental restructuring and structural changes on the principles of equity and justice in order to bring the world economy into a more equitable long-term equilibrium.

7) Trade and commodity issues

Whereas African economies were characterized in the 1960s by an active export sector, and the prices of primary commodities were relatively remunerative while the balance of payments, in a majority of cases, was positive, the situation turned for the worse in the 1970s with the increase in import bills for energy, manufactures and capital goods against a steady declining trend in export earnings, and has quickly climaxed into a crisis situation in the 1980s. The major concern in the 1990s, therefore, is to ensure that Africa's financial relations with the rest of the world serve as a driving force for national and regional development rather than as a vehicle of depression and retrogression, that the external trade must be diversified to include not only primary commodities but manufactured goods as well.

8) Debt and financial flows

Our estimates at ECA show that the debt/GDP ratio, debt/export ratio and the debt service ratio will be much higher in the 1990s than they were in the 1980s unless drastic measures are taken now, and that the overall situation will become severely aggravated as most African countries face the agonizing need to increase borrowing merely in order to service new debt maturities and to reduce arrears in debt service obligations which may increase even further if the current upward trend in the interest rates in the creditor countries are maintained. Thus, one of the major concerns in Africa in the 1990s is the pressing need for an immaginative and comprehensive solution to the debt crisis.

9) Economic integration

That the socio-economic structures of the African countries have remained largely undeveloped after more than three decades of political independence while other developing countries have progressed significantly in

economic development is a serious cause of concern. The colonial heritage of small and micro-states hardly is capable of meeting the challenges of development render many African economies virtually unviable entities, devoid of the necessary dynamism and momentum for economic take off. This balkanization, and fragmentation of markets have generated a host of insurmountable problems in the course of national economic development and indeed continues to fu frustrate the development efforts of many African countries twards self-sustaining development. Thus, one's concern of development in the African region is to foster economic co-operation and integration in order to collectively overcome the development impasses facing the region as a whole, by strengthening and building the institutional capabilities necessary for enhancing efforts towards the establishment of the African Common Market by the year 2000 and beyond, as a priority of the first order. If, as is increasingly evident, the 1990s is likely to be a decade of trading blocks and growing bilateralism and intense protectionism - with the planned consoldiation of Europe into Common Market in 1992, the US-Canada Free Trade Area, the Austrialia-Newzealand free Trade Agreement Area, and an OECD for Asia - then Africa surely must strive harder tat economic integration and co-operation in the 1990s.

Assuming that all these assumptions are met in the 1990s, the study project that developing Africa as a whole will grow by 5 to 6 per cent annually, with agricultural output increasing by 4 per cent higher than the population growth rate and manufacturing industry by 8 to 10 per cent depending on the countries. Otherwise the nightmare that was projected in our previous perspective study would prevail throughout the 1990s.

Reference Notes

1/ See UNECA, "Perspectives of the African Region in the 1980s and Policy Implications", March, 1980 E/CN.14/737); "Projections Results of Some Individual African countries" (E/CN.14/737/Add) "Quantitative Analysis of the Problems and Perspectives of the African LDCs" and "Perspectives of the African Least Developed Countries in the Framework of the Third United Nations Development Decade" (E/CN.14/748), March 1980.

2/ See UNECA, "Sectoral Projections: Some Basic Approaches" (ST/ECA/PSD.2/10), March 1982.

3/ This model is similar to the so-called "Feldman-Mahalanobis Growth Model" which was applied lto the Indian economy by Mahalanobis.

4/ See UNECA-SERPD, "Note on Social Accounting Matrices and their Adaptation in the African Context", Working Paper No. 1/82, November 1982.

5/ UNECA, ECA and Africa's Development, 1983-2008, Addis-Ababa, Ethiopia, April 1983 2hich sketched out a "nightmare scenario" that described the consequences of continuing high population growth and stagnation or declining per capita income in the year 2008 and a "normative scenario" for the improved conditions

6/ UNECA, "Review of Progress on Short-term Forecasting in the African Region" (E/ECA/PSD.3/16), March 1984

7/ In fact, two national experts from Rwanda were in one month training activity at the ECA headquarters in 1987. Some training are provided in the countries themselves, using national facilities

8/ See UNECA, "Integration of the Informal Sector in Multi-sectoral Development Planning" (E/ECA/PSD.5/9/2), March. 1988' "Dynamization of Input-output Technical Coefficient Experiments in Long-term Projection of Economic Growth in Developing African Countries" (E/ECA/PSD.5/9/3), March, 1988' "Report of the Workshop on Multisectoral Planning Models and Short-term Economic Forecasting for Policy Design in Development Planning and Management in African Countries" (E/ECA/PSD.5/9/5) March 1988.

9/ See UNECA, "Sectoral Planning with Subregional Co-operation concerns and Arrangements" (E/ECA/PSD.5/7); "Sectoral Planning within co-operative mechanisms in the Field of transport and Trade Case-study of the Economic Community of Central African States" (E/ECA/PSD.5/7/Add.1); Sectoral Planning in Subregional Arrangements: Transport and Communications, Trade and Finance: Case study of West African States (ECOWAS), (E/ECA/PSD.5/7/Add.2) Sectoral Planning in Subregional Arrangements: Transport and Communication, Trade and Commerce: Case of Preferential Trade Area for Eastern and Southern African Countries (PTA) (E/ECA/PSD.5/7/Add.3); and "Towards the Establishment of Preferential Trade Area in North African States" (E/ECA/PSD.5/7/Add.4) March 1988.

10/ A resolution was passed by the African Ministers of Economic Development Planning in Niamey supporting this ECA/DIESA initiative to bring the African countries models into the World Project LINK (April 1988)

11/ See UN General Assembly A/S-11/14 Annex I or OAU, the Lagos Plan of Action and Final Act of Lagos, ILO, Geneva, 1981

12/ See UN General Assembly A/40/40 and A/S-13/2 Annex, respectively

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METHODOLOGICAL AND TECHNOLOGICAL INNOVATIONS IN THE AREAS OF DEMOGRAPHIC DATA COLLECTION, PROCESSING AND ANALYSIS

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METHODOLOGICAL AND TECHNOLOGICAL INNOVATIONS IN THE AREAS OF DEMOGRAPHIC DATA COLLECTION, PROCESSING AND ANALYSIS

I INTRODUCTION

1. Demographic data describe the structure, distribution and growth potential of country's population at any given point in time. Thus, they constitute an essential tool for planning, monitoring and evaluating the socio-economic development activities undertaken by a government. The information is also useful in research work and in forecasting business trends.

2. Population censuses, demographic surveys and civil registration systems are the main sources of demographic data although in a few countries such data can be compiled from population registers.

3. Whatever the source of data, their usefulness is enhanced to the extent that they are relevant, timely and accurate.

4. It is recognized, though, that any large data collection exercise cannot be error-free. Every effort, however, needs to be made at the various stages of their collection and compilation to anticipate the types and varieties of deficiencies and to take measures to ensure generally acceptable quality. Further, the data have to be evaluated, analysed and disseminated within a relatively short time after their collection to ensure their effective and extensive applications.

5. There have therefore been continuing efforts to develop strategies and improve on methods and techniques for the collection, processing, evaluation, analysis and dissemination of demographic data to ensure that they satisfy the data needs of various users in terms of their relevance, accuracy and timeliness.

6. The paper attempts a review of some of the major methodological and technological innovations in the fields of population censuses and demographic surveys which are the principal sources of demographic data in the African region.

7. The discussion is divided into three parts. The first part deals with developments in the area of data collection including census/survey cartography, the second focuses on computer processing while the third part is devoted to data evaluation, analysis and dissemination.

II COLLECTION OF DEMOGRAPHIC DATA

8. As indicated earlier, censuses and surveys are two of the main sources of demographic data. Indeed, in most African countries they constitute the only sources since civil registration systems are generally incomplete and in most cases deficient.

9. A population census has been defined in the UNited Nations publication: Principles and Recommendations for Population and Housing Censuses as the "total process of collecting, compiling, evaluating, analysing and publishing or otherwise disseminating demographic, economic and social data pertaining, at a specified time, to all persons in a country or in a well-delimited part of a country".

10. As can be seen from Annex I, with the exception of Chad, all African countries have conducted at least one population census and for some of the countries- Egypt, Gambia, Ghana, Lesotho, Mauritius, Seychelles and Swaziland - the history of their censuses dates back to the 19th century.

11. There are two principal methods for the collection of data in a census. These are the direct interview or canvasser method and self-enumeration or householder method. Most countries in the African region have used the former method in their recent censuses. The method involve the use of trained enumerators who move from house-to-house to administer a standardized questionnaire.

12. Although censuses constitute a major source of demographic data, they are conducted infrequently-generally at ten-year intervals - hence demographic surveys are increasingly becoming the widely used method of demographic data collection in Africa. The basic difference between a population census and a demographic survey is that the former involves total coverage while the latter involves the convassing of a sample of the population. The selection of samples for demographic surveys is usually based on probability methods which enable researchers and statisticians to make required inferences.

13. A demographic survey can either be specialized, in the sense that only demographic information is collected, or generalized, in which case demographic items form only part of the information collected.

14. Both types of surveys have been conducted in the African region. The surveys conducted in the region may also be classified into two main groups namely, those conducted under continuing survey programmes and ad hoc surveys.

15. The most critical phase of a census or survey is the stage for the collection of information from the population. The types of problems faced and procedures used for the collection of data are similar for censuses and surveys hence innovations in procedures in both sources of data are discussed together in this paper. The discussion focuses on the following strategies for the collection of data: questionnaire design including provisions for dealing with situations where two or more languages are used in a country, audio-visual training of field staff, quality control of enumeration/interviewing through use of field editors, use of micro-computers for data collection and census cartography.

A. Questionnaire Design:

16. In Africa, as in other developing countries, collection of demographic data either through surveys or censuses is usually done on standardized questionnaire/schedule appropriately designed to assist both respondents and enumerators in accurately providing and recording the required information. It is important to mention that questionnaire design is one area in the whole spectrum of survey design that is always experiencing changes aimed at improving its efficiency and effectiveness.

17. Recent improvements and/or changes have included increasing use of verbatim questions; pre-coding of responses and use of multi-lingual questionnaires, as well as use of computer in questionnaire design. Each of these is briefly discussed below.

(a) Verbatim questions:

18. It can be appreciated that control of answer recording in a situation like population census, where hundreds of interviewers and thousands of respondents are involved, will be difficult to achieve. The problem is even more pronounced in questions that concern opinions and attitudes of respondents.

19. The problem can partially be solved by use of verbatim questions which, in effect, require that an enumerator read a complete question to a respondent. Experience gained, so far, indicate that the method, if properly applied, ensures uniformity of data between different enumerators and respondents.

(b) Pre-coding:

20. Closely associated with the use of verbatim questions in questionnaire design is the pre-coding of response categories. This technique involves the provision of a list of responses, in most cases obtained from similar surveys/censuses carried out in the past, and respondents requested to choose among the

alternatives. The responses are pre-coded and enumerators are required merely to mark a box, encircle a code, underline printed alternatives, etc.

21. It is not uncommon, these days, to find questionnaires which are totally pre-coded. Advantages, so far, observed with the procedure include:

- Reduction of errors that may be introduced during office coding.

- Respondents and enumerators have an opportunity of choosing an answer from alternatives given.

- Reduction in time needed for data processing due to elimination of office coding.

(c) Multi-lingual questionnaires:

22. It has been observed, especially in developing countries where two or more languages are used, that misunderstanding and introduction of unnecessary errors are common when the language of questionnaires is different from the language of interview.

23. Current solution to the problem entails translation of census/survey questionnaires into as many languages as can practically be done and utilization of interviewers who understand and preferably use the local language. It may be recalled that the World Fertility Survey (WFS) in which a number of African countries participated, effectively used, wherever that was possible, multi-lingual questionnaires. Also, it need be mentioned that the idea had earlier been attempted in Ghana during its 1960 population census when translations of the census questionnaire in the major languages were included in the Enumerator's Manual. Of course, there are numerous operational and logistical problems associated with the use of multi-lingual questionnaires. The method, however, has a noticeable advantage and it need not increase significantly total cost of questionnaire development.

(d) Use of computer in questionnaire design:

24. In designing a questionnaire, the objectives to be achieved are readability, simplicity, good appearance and processability. Appropriate microcomputer softwares have become useful tools to accomplish these objectives.

25. A number of word processing packages can be used to design questionnaires. Indeed they allow users to type documents, modify them on screen, print in appropriate formats and save the documents

on disk for later use or additional editing. Other packages contain specific features such as multicolumn format, variable spacing horizontal scrolling and block copy functions.

26. To produce a well designed questionnaire, a word processing package must contain features for printing in a variety of styles and sizes. The use of a laser printer would permit production of high quality questionnaires. The following packages can be used for designing a questionnaire: multimate, word, word perfect, ESP, GRIDS, XYwrite and Framework.

B. Audio-Visual Training of Field staff

27. It has been, and still is, the usual practice to give lectures, assign exercises, and hold mock interviews during training sessions for enumerators and supervisors in preparation for major data collection exercises.

28. The procedure, though effective, has some weaknesses. Particularly, in the training of census field staff, the simulteneous training sessions spread over many training centres and involving use of a large number of trainers may result in training programmes of varying standards.

29. Audio Visual training, particularly through recorded training programmes on video-casettes and a country's television network has been recognized as a useful strategy to ensure standardization in the training of census/survey field staff. However, such a strategy involves high costs which presently many developing countries can least afford.

C. Quality control :

30. Introduction of quality control procedures at all levels of census/survey activities is essential if data are to be of acceptable accuracy. The case is even more crucial in population censuses, in view of the involvement of large numbers of respondents and enumerators.

31. It has been observed that quality control is, sometimes, not given adequate attention in African censuses. Generally, the quality control measures, adopted in many developing countries, involve: the recruitment of appropriate enumerators and use of a high supervisor/enumerator ratio. These, however, do not cover the total arena of census/survey quality control activities. It is necessary to note that a continuous and widespread application of quality control procedures should, wherever possible, be enforced at all stages of data collection exercise.

32. Recent development, in the continuous effort to improve quality of data, have included: use of competent editors at the field level and use of tape recorders during enumeration/interviewing.

(a) Field Editors:

33. Deployment of editors to review and edit questionnaires at the field level has proved effective in controlling the quality of work at the data collection phase of censuses/surveys. The procedure assists in detection of simple errors, like ommissions, duplications, inconsistencies etc., at an early stage and therefore allowing for early remedial action. Needless to mention that the method reduces to a minimum, and in some cases eliminates, the problem of referring questionnaires back to the field .

(b) Tape Recording :

34. In an effort to intensify supervision, some countries are now providing enumerators with tape-recorders which they use in recording a selected number of their interviews. The taped interviews are forwarded to supervisors and/or survey planners who use them to assess competence of individual enumerators in handling respondents and cross check responses recorded on questionnaires against interview responses. The method is, however, costly and time consuming.

D. Computer-assisted Interview

35. The initial use of computer in census and survey programmes had been in the editing of data and the production of relevant statistical tables. Subsequent developments in hardware and software, however, have broadened the scope of computer processing and made it possible to use the computer for all phases of data processing from data entry to the presentation of the required tables for publication. Indeed the computer is also used for office automation including questionnaire design and desktop publishing.

36. Such developments together with technical advances in microcomputer technology in turn made computer-assisted interview a feasible proposition in the collection of data. Indeed, the develoment of 'lap-top' computers and appropriate computer-assisted interview packages opened up the possibility of an interviewer using a computer-based questionnaire and coding instructions to conduct an interview and thus eliminating the use of a separate office coder.

37. Initially, computer-assisted interview software packages were developed for use in situations where interviews are to be conducted by telephone. The recent advances which have increased the storage capacity of micro computers have, however, opened up the possibility of using computer-assisted interview packages in field interviewing. The strategy involves an interviewer entering codes of responses directly into a portable microcomputer and any necessary consistency checks carried out. The data are then periodically transferred to a larger computer system for further processing. It should be pointed out, though, that if a microcomputer is to be used for data collection then its storage capacity should be able to store:

- programs which control the interview
- relevant codes lists and coding frames; and
- reasonable number of sets of [illegible]

38. Advantages of the strategy include increased ability to check and correct inconsistencies at the time of interview or shortly thereafter and significant reduction in processing time. The approach, however, means providing each interviewer with a micro computer and the related cost, maintenance problems and higher risk of loss of the equipment do not make the strategy a viable approach, at present, in the collection of data in censuses and large-scale surveys, particularly in African countries.

E. Developments in Census Cartography

39. In terms of methodology and technology, census cartography has made considerable progress over the last five years. This has been made possible by placing in orbit satellites such as Landsat Thematic Mapper (TM) and Spot which produce high-resolution images and make it possible to observe land use on a constant basis. Another reason for such progress is the advances in microcomputer technology.

(a) Satellite imagery

40. The great advances in remote sensing technology, (Landsat TM and Spot Satellite) have made it possible to produce images of very high resolution (up to 10 meters in panchromatic) which have been effectively used to up-date basic maps of rural areas where land use changes frequently and town plans, particularly of those metropolitan areas having a very high rate of population growth and changes in the urban network.

41. In this regard, note should be taken of the new area sampling technique by which a team of ORSTOM research fellows recently used satellite images to conduct demographic surveys in the French town of Marseille and the town of Quito in Ecuador.

42. The method developed used a two-stage stratified sampling here: the morphology of the towns were stratified according to density taking into account the height and position of buildings; delineation and selection of first-stage units (blocks) by systematic use of point gradation technique; and selection of second-stage units consisting of households. The satellite imagery is used to:

(i) Define the sampling base (universe);

(ii) stratify the sampling base according to the density of built-up structures and;

(iii) the selection of sampling blocks.

43. The Equipment needed to carry out this methodology consist of:

- an IBM-AT/PS-2 micro-computer or compatible;
- a printer;
- a software package for survey data entry and processing (eg: IMPS);
- a software package for processing satellite images on PC (eg: TIMOR-developed by ORSTOM);
- a compass, a clinometer, a decameter and a manual planimeter).

44. There is still room for improvement in this method in particular through the morphological stratification of satellite images which takes into account the height and the dispersion of the houses.

45. In conclusion it could be said that, in view of its cost, accuracy and the limited equipment needed, this method is relevant and in the collection of demographic data in major towns where characteristics change rapidly and which don't have comprehensive and up-to-date sampling frame.

(b) Micro-computers

46. Micro-computers have also revolutionized census cartography. Indeed, they have made it possible, through a completely or partly automatic process to prepare thematic maps and graphics for visualizing, storing and managing demographic data.

47. Among the new portable and high-performance equipment available mention can be made of (in addition to the central memory of the PC itself) the digitization tablet for data entry and the dot matrix colour and laser printers as well as the tracing tables or glides which serve as output devices.

48. There are also many software packages which combine data tabulation and data import/export modules with ASCII and DIF indices (e.g. Freelance, Atlas Grapics, etc.).

49. It would therefore seem that all is set for the automatic building and management of geo-demographic data banks. This would greatly lighten the long and arduous task of census cartographers in the publishing of collected data, the filing of cartographic products and the continual up-dating of the sampling frame during the intercensal period.

III. COMPUTER PROCESSING

50. The pace at which changes are occurring in computer technology has increased spectacularly in recent years and the most marked change today is the shift to the use of micro-computers to process survey and census data.

51. The successful use of micro-computers for large-scale statistical computing with the manipulation of extensive and voluminous data is now guaranteed by powerful software packages and the increasing storage capacity provided by peripheral disk units.

52. This explosion in micro-computer technology has even made it possible, local conditions permitting, to process data in a decentralized manner.

53. A number of initiatives have been taken in the various phases of data processing. An attempt will be made to characterize each of them with particular reference to the data entry, data editing and tabulation phases within the context of an integrated programme.

A. Data Entry

(a) Equipment

54. Data entry is the first phase of computer processing and consists of transferring information from questionnaires on to computers. This can be done when appropriate hardware and software are available and the staff who would operate them during this phase have been adequately trained.

55. The data entry equipment used in recent years generally comprise work stations hooked up to mini-computer terminals. Currently there has been a shift towards a systematic use of micro-computers. The experiments conducted with micro-computers have all been satisfactory and all the more so because of the increasingly

high performance of the software available today. Because of the requirements of certain software packages, the selection of hardware for data entry is increasingly shifting to those having hard-disk components.

56. Commercial products have been placed on the market but they are expensive and protected. Examples are Entry Point and Rode/PC. Other software not rating as high in performance are distributed free of charge. Examples are PCEDIT, ISSA, IMPS, the last two of which are particularly recommended because of the possibilities they offer for creating data dictionaries. IMPS, however, requires the use of a Realia Cobol compiler.

57. In determining the size of a data entry work station, account should be taken not only of such parameters as volume of data, operator performances and verification rate but also factors relating to local conditions. In addition to all this, the fact that electricity supply is unpredictable and has adverse effects on computer equipment makes the procurement of current regulators, uninterruptible power supplies and generators necessary.

58. The power of software and the easy programming they provide have simplified controlled data capture which is the general practice nowadays. Simultaneously with data entry validity tests are conducted on range, likelihood, consistency and structure of the data keyed. In order to avoid a slow-down of data capture resulting from recourse to a supervisor when inconsistency is detected, it is advisable to limit the number and nature of such tests.

(b) Monitoring

59. Each working day, the output and performance of operators should be recorded and periodically reviewed in order to ascertain that data entry is proceeding according to schedule. The data entry software packages mentioned earlier come with features for generating statistics on operators. They should therefore be used judiciously.

(c) Decentralized approach

60. As indicated earlier, the proliferation of increasingly high-performance and low-cost micro-computers has made it possible to foresee the decentralization of data entry, if not the entire phase of data processing. It will not be easy, however, to implement such an approach because the following conditions must be fulfilled if things are to go smoothly.

- The degree of decentralization must be worked out judiciously;

- the equipment and staffing required and their costs must be accurately estimated; and

- the training of personnel should be accompanied with equal strictness in the enforcement of instructions and working methods.

B. Data Editing

61. The purpose of data editig is to achieve comprehensiveness in all the data entered and to make sure that there is no duplication of effort. It also ensures that the data are consistent and accurate.

62. A comprehensive computer programme should be prepared to that end. To do this, the experts involved in the operation should jointly prepare the edit specifications in a logical manner which avoids redundancy in correction procedures. The methods for correcting errors should involve two types of procedure: procedures for determining the variables to be corrected and procedures for deterministic or random imputation.

63. The software programme mostly used at this stage is the CONCOR module of IMPS.

64. It is advisable to set up a manual control system that allows for checking the corrections made by the programme. Such a system may involve comparing the basic tables generated from the data sheets before and after the editing exercise.

C. Tabulation

65. The tabulation plan prepared by systems analysts should take into account the software to be used and should contain defining elements on the basis of which programmes can be prepared. For a given table, the target population should be indicated together with the selection criteria, geographical levels and other indications.

66. The tabulation software most often used is the CENTS module of IMPS.

67. Tables may be produced as and when data are keyed and verified. Results may also be presented in graphic form using appropriate packages such as Harvard, Chart, Freelance, etc.

68. For the preparation of final reports, desktop publishing software such as Ventura and Pagemaker could be used.

IV. EVALUATION, ANALYSIS AND DISSEMINATION OF DATA

69. The role of the demographer/analyst in the evaluation and analysis of population census and demographic survey is very crucial. Several methodological and technological tools have been made available to lighten the burden of the analysts and to expedite publication. Some of these innovations are highlighted below.

A. Methodological Innovations

(a) Evaluation and adjustment of data

70. There are several methodolocial innovations available for improvement of the quality of an information from the stage of preparations for data collection to the compilation of the data. Also there are techniques for the evaluation and adjustment of the data when once the types and magnitudes of errors and biases are delineated.

71. At the stage of preparations for data collection and during field operations, in addition to proper planning and making arrangements for publicity and education, there are quality control measures which can be instituted to assure data quality. Again, at the data compilation stage adequate supervision and quality checks can be enforced to vouch safe better quality of data and at least to safequard against further deterioration of data quality.

72. Yet inspite of all precautions, some deficiencies may persist in the data which then will have to be evaluated and adjusted.

73. It has been demonstrated that a well designed and conducted sample survey can throw detailed light on demographic parameters as illustrated by the World Fertility surveys (WFS), the Demographic and Health Surveys (DHS), the African Household Capability Programme Surveys (AHSCP), the Contraceptive prevalence surveys (CPC), the Living Standards Measurement Studies (LSMS) and the Social Dimension of Adjustment project (SDA) and the series of migration surveys conducted in the ESCAP region. A large volume of technical publications and documentation are available highlighting the use of such surveys in developing countries. Even though a few African countries have participated in the fertility, health, contraceptive prevalence, living standards and household surveys and their experiences are adequately documented, not much effort has been made to exploit fully and systematically these

methodological tools. These surveys in addition to transferring new methods and technologies also strive to build institutions through active collaboration in data collection, analysis and research and endeavour to bring together data users and producers at national level and, to a certain extent, also engender international collaboration and exchange of experiences.

74. The data situation in Africa has improved tremendously in the last decade thanks to the African census and survey programmes and several special surveys assisted by international agencies. African censuses have been quite comprehensive and have included demographic variables and socio-economic, geographic, household and housing information. Since other sources of information are lacking or deficient, censuses have become the major avenue for demographic data and hence most countries collected various types of basic demographic data. Annex II gives the demographic information collected during the 1980 round (1975-84) of censuses. In addition, most countries included questions bearing on education, economic activity, physical status or disability, household and housing characteristics and even community level variables.

75. For instance, during the 1980 round of censuses, all the countries collected information on age, sex and relationship of members of households. Marital status, place of birth and ethnic/tribe/nationality information was collected in 43 of the 47 countries. Data on children ever born and on recent birth or birth last year was included in 33 countries whereas the number of living or dead children and residence status of individual members were enquired only in 32 countries. Duration of residence was obtained in 21 countries and survival status of recent/last birth and residence at specified time in past was canvassed in 20 countries. Another item included in 18 countries pertained to deaths in households. Even though there were several other types of basic demographic information collected, only a few of the countries collected such data. On the whole, it can be said that these information will enable an analyst to study population dynamics.

76. With the wider availability of data for most countries in the region it has now become possible to apply methods and techniques which could not be operationalised in the past. For instance, single year of age data is now available for all the countries and in most cases at sub-national and other small area levels. Thus, it is possible to study digit preference and other types of errors and biases and to discern the appropriate grouping or other manipulation of data to minimise the biases. Also more specific techniques like the Preference Pattern Index (PPI) can be easily applied to data to delineate the pattern and intensity of digit preference errors in the context of varying age composition as for rural/urban population distributions oand those generally affected

by migration like sub-national or other small area populations. The PPI takes care of age-sex composition of population and hence is preferable to the Myers Index (MI) although it is similar to the MI requiring the calculation of 10 matrices starting with end digits 0,1,...,9 for each sex usually in the age ranges 10-69. However, whereas the MI deals with the actual observed numbers, the PPI uses percentages in each of the ages to the total in the group... Not many countries have utilised the PPI in their data analysis but wherever it has been applied, it has thrown much more light on the quality of single year data than the usually applied Digit preference index originally developed by the US Bureau of the Census, the Whipples, Myers, and Bachis indices. Even though the computation of PPI requires more effort than the other indices, the use of computers and appropriate programmes or use of Lotus spread sheets can lighten the work.

77. Noting the fact that digit preference errors vitiate even grouped data, the need for evolving tests for data quality has become imminent. For instance, the Age ratio defined by the UN as the ratio of the population of a given age group to the average population in the adjacent two ages has been shown to be affected by the preponderent preferences for specific end digits in age reporting. However, this can easily be taken care of by defining the age ratio as the ratio of population in an age group to the weighted average of population in the three age groups including the two adjacent as well as the age group under consideration. The weights suggested are 2 for the mid-age group and 1 each for the neighbouring ages. This method not only removes the effect of digit preference errors, it also ensures that deviations of these ratios from the expected value of unity is minimal and takes into account, to a large extent, the curvilinearity of the age distribution. The age ratio score can then be defined as usual.

78. Another modification suggested in the evaluation of data is in regard to calculation of sex ratio scores. Since the UN method tacitly assumes that the sex ratios are constant over the age range, it has been observed that the score obtained may not reflect the data quality. It seems better to define the deviations of sex ratios as one half of the second differences of consecutive sex ratios instead of the first differences. The sex ratio score then is defined as the average of these absolute differences.

79. The UN defined a composite index of data quality as the sum of age ratio scores for males and females and three times the sex ratio score. The rationale for higher weight for the sex ratio score is that it is much less variable than age ratios and hence has a better predictive value. A value of the score less than 20 indicates acceptable quality of data. An index between 20 and 40 denotes inaccurate data and a value above 40 means that the data

are grossly deficient. There is need to re-examine the UN Joint Score especially in regard to the weight given to the sex ratio score and the classification of data as acceptable or otherwise in view of the large amount of single year and grouped data available for several points of time for developing and developed countries and the observation that both the age ratio and sex ratio methods have been suggested to need modification to reflect African data situations. Perhaps the application of multivariate techniques like discriminant or classificatory analysis may be tried.

80. In addition to the above vertical and horizontal consistency checks based respectively on age and sex ratio scores, it is now possible to test diagonal consistency of data in a large number of African countries because of the availability of more than one census data. The survival ratios - both cohort and overall - can be fruitfully employed to study not only consistency between two census enumerations but also for calculation of life tables. Some methods for deriving the parameters of population change - fertility, mortality and migration - will be indicated later. But a simple yet powerful method based on two censuses taken at intervals of 10 years which is unfortunately not so widely known is that suggested by Hardy. In this method the crude death rate during the intercensal interval is estimated as:

$$D = 0.4(P_{0+} - P'_{10+})/(P'_{0+} + P_{0+})$$ where

P'_{x+} and P_{x+} are respective populations ages x years and over at the second and first censuses. The crude birth rate can then be estimated as the difference between the natural growth and crude death rate. Estimate of life expectation can then be matched with a suitable stable population model with these vital parameters. The assumption involved is that the population is not affected by migration and that the two enumerations are ofsimilar magnitude of coverage. This method can also be utilised as an evaluative tool for coverage of the younger ages.

81. There are also several other consistency checks possible based on age-sex data through the calculation of various types of rates and ratios like child woman ratio, dependency ratio etc. which can then be compared with either suitable model populations or with another country having similar demographic situations.

82. Yet another novel avenue for data evaluation is through the channel of consistency-convergency criteria. In these procedures, the enumerated age-sex data are manipulated analytically to derive vital parameters and these are then compared with known values and with themselves. The forward and backward projection techniques

which can easily be carried out by using available computer packages are powerful tools in this exercise. A few other techniques will be indicated while discussing analysis of data.

83. The availability of a variety of model populations, the improved data situation in the region and the accessibility to the computer has made the problem of operationalising some of the above methods rather easy.

84. Once the types and magnitudes of errors are delineated, the problem of adjusting the data will remain. Several methods based on mathematical, demographic or analogy are available. It seems that a combination of mathematical and demographic methods may be most suited to countries in Africa. In this connection, the method proposed in the UN Manual X (Indirect techniques for demographic estimation, New York, 1983) utilising the available age-sex data in conjunction with population models and a mathematical curve looks promising. Most of these methods can be carried through with the aid of spreadsheets.

85. Application of some of the above ideas to some African data are illustrated in a recent publication of the ECA which is based on a training workshop held at RIPS, Ghana. (Workbook on demographic data evaluation and analysis, 1989).

(b) Data analysis

86. A serious lacuna in developing countries in general and African countries in particular is the lack of direct information on the dynamics of popualtion change. Indirect questions bearing on fertility, mortality and migration are usually the only avenues available to arrive at the level, trend, pattern and differentials of these vital parameters. Several techniques based on reported age-sex data also are available.

87. The original methods developed by Brass for the estimation of fertility and mortality have been modified and fine tuned to reflect both data availability and the fact that some of the assumptions may no longer be applicable.

(c) Fertility analysis

88. The Brass relational Gompertz model using parity and cumulated fertility based on one and two census data and the Zlotnik-Hill method for hypothetical cohorts have been noted to be useful in the estimation of fertility in African coutnries, using the indirect questions bearing on fertility.

89. Based on age-sex data from one and two censuses, the reverse and forward survival methods and its variations like the survival ratio methods for five year age groups and cumulated populations by age; the UN Manual IV method using age-sex distribution and a life table or growth rate/gross reproduction rate; the Coale method using C(15) - population under age 15 for both sexes- , an estimate of 1(5)- the life table population at exact age 5 with a radix of unity-and an intercensal rate of growth; the Preston-Coale equation using C(15), intercensal age specific rates of growth and 1(5) and the Preston integrated method for two census age -sex data are some of the methods which have been found to be robust under the existing conditions in the region. More and more methods are now being evolved to estimate demographic parameters from the important information collected in every census or survey, viz., the age-sex data. In this connection an elegant method based on the reverse survival ratio technique proposed by Venkatacharya and Tesfay recently to estimate birth rate from an age distribution, a growth rate and value of 1(5) deserves mention here. By this method the birth rate:

$$b = C(15)\ \mathrm{Exp}\ (7.5\ r) / [\ .365 + 14.6\ 1\ (5)\ ]$$

where c(15) is the cumulated proportion up to age 15 for both sexes, r is the growth rate and 1(5) is the life table population at exact age 5 for a radix = 1.

90. This estimate is equal to that from the well known reverse survival ratio method of obtaining birth rate from population enumerated under age 15 and is simpler than the equation given by Coale for a robust estimate for a stable population in that one does not need to assume stability of the population. Illustrations of these techniques to African data are given in the ECA Workbook mentioned earlier.

(d) Mortality analysis

91. For the estimation of mortality utilising indirect questions on survival of respondents the Brass child survival method and its modifications by Trussel and Sullivan and further adaptation given in the UN Manual X and the estimation of intercensal mortality by using hypothetical cohorts as elaborated by Zlotnik and Hill are found to be suited to data situations in the region. For adult mortality the maternal orphanhood data seems more suitable under the existing situation in African countries.

92. Based on one or two census age-sex data there are several methods which could fruitfully be employed to arrive at mortality estimates. For instance, the Hardy method and the Manual IV method already referred to for estimation of fertility also produces estimates of mortality. The Arriaga, Stolnitz and Coale-Hoover methods also could be applied when age-sex data from one census and an estimate of growth rate is available. When two census age-sex data are available one can try the Carrier-Hobcraft, the Coale-Demeny projection and cumulation and the Preston - Bennette methods. The ECA Workbook referred to earlier has illustrated the application of these techniques to some African data.

93. Unfortunately some of these methods have not yet been prepared for micro computers and hence ready made softwares are not available. However, for most of them the main frame version programmes are already available. The Regional Institute for Population Studies has prepared programmes for the methods illustrated in the ECA Workbook and micro computer versions are being explored. Most of these techniques however can easily be operationalised by use of spread sheets.

(e) Migration analysis

94. For the estimation of migration, questions on place of usual residence, place of birth, duration of residence in place of enumeration and place of residence at a specified time or certain number of years ago which are canvassed in most of the countries could be utilised especially if they are cross tabulated by age, sex and meaningful geographic areas. The census survival and life table survival ratio methods are useful tools in estimating migration when age-sex data are available at two points in time. The forward, backward and average survival estimates could be used to estimate migration depending on the information on the pattern of migration over the intercensal interval. The Lotus spread sheet method or the POPSYN programme (NETMIG) could be employed in these exercises. Population projection (forward and backward) programmes available in several micro computer packages could also be fruitfully employed in estimating migration by the survival ratio methods.

(f) Some observations

95. There are several softwares for microcomputers like the UN Mortpak lite, the East West Institutes EASWESPOP, and the POPSYN recently introduced by the Garcia-Bogue Research and Development Ltd. which include some of the methods for data evaluation, adjustment and for derivation of vital parameters. Annex III gives some of the micro computer version of softwares available for data evaluation, adjustment and analysis.

96. An area where methodological developments have not kept pace is that of analysis of socio-economic and household housing especially in respect of computerisation of available methodologies to enable analysts to arrive at meaningful results from available data in a short period of time. ILO prepared a software for projection of labour force and of urban/rural populations. There is need for softwares for projecting school populations, households, families, sub-regional populations etc. This will ensure the fuller integration of population variables in socio economic development planning.

B. Technological Innovations

97. In the evaluation, adjustment and analysis of data, the crucial role of the computer has been alluded to time and again. Thus the advent of the micro computers has revolutionised the data analysis by eliminating some of the routine chores and enabling the analyst to carry out a wider variety of data manipulation at a much shorter time.

(a) Data analysis

98. The computer again has provided a powerful tool to the analyst who with the aid of ready made softwares or custom built programmes can now hope to evaluate and analyse a huge mass of data in greater details of depth and breadth in much shorter time period as well and thereby assist planners and policy makers at local and other sub national levels to effectively integrate population and related data in their decision making and action programmes. However, as with any ready made programmes, there is need for testing and assuring that the results do reflect the socio-economic and demographic realities in the area under study. There is also the need for developing softwares and programmes which will be responsive to the specific demographic, socio-economic data situations in the countries which may not be identical with other developing or developed countries. In other words, blind application of available techniques should be avoided and appropriate methods suitable to the country under study should be aimed at. The role of trained demographers in this endeavour is very important.

99. In the study of population distribution and migration a consistent problem has been the difficulty of preparing maps, charts and diagrams in sufficient details and quantity as to cater to the ever increasing demands of local and small area planners and especially the emerging needs of environmental studies. With the availability of computers and specialised softwares it is now not a difficult task to obtain these useful tools from the raw data. Annex III mentions some of the available softwares in this connection.

(b) Dissemination of information

100. In recent years, a number of important developments have taken place both in technology and user needs and demands for data. As a consequence, the role of statistical offices has changed and there has been need for their reorientation and further streamlining to meet the emerging situations. The developments include availability and increased resort to alternate media for preparing and disseminating data to the users eg. census tapes, computer printouts etc. Further, modern technology has enabled the integration of data processing and printing directly from computer outputs. The use of computers to produce directly the tables and results avoids time consuming tuping, proof reading and correction of manuscripts and materials and assures that no further errors will creep into the data. Another spin off from the use of computers has been the ease with which the tables and reports could be published from computer printouts and the versatility of desktop publishing which in turn has to a large extent, removed the inordinate delays in the publication of census or survey results which used to mar the value of data. However, the quality of output being directly related to the quality of inputs, it is imperative that the inputs be of sufficiently high degree of acceptability and that methods and techniques applied are not only appropriate but are in fact the best under te circumstances and in no way should they introduce other errors and biases.

C. Observations and Conclusions

101. The methodological and technological innovations available to the demographer/analyst has been such as to make his task easier. For example, it is a routine matter to apply some of the demographic evaluation, adjustment and analysis techniques without much knowledge of their strong and weak points. At the same time, it has to be stressed that in order to draw meaningful inferences from data, it is essential that the quality of the information must be good and the techniques and methods are utilised with introspection. This implies that one has to be aware of the effect of defective data on results and conclusions while at the same time being cognizant of the consequences of an indiscriminate application of techniques of evaluation and analysis of data. This calls for a deeper understanding of the methods and the ability to adapt and modify existing methods to suit the conditions on hand. This is a challenge to demographers in the region to face and come up with solutions to the emerging issues. Especially important is the study of the effect of various types and magnitudes of errors and biases in the data observed in African censuses and the adjustment techniques utilised on the estimated vital parameters. Simulation experiments are called for in these exercises.

102. If the demographer/analyst is to be effective he/she should also be familiar with some of the softwares and programmes like word processing, spreadsheet, data base management and in general with the operation of micro computers in order to derive the maximum from these technological aids. It cannot be over emphasized that micro computer use on a vast scale can take place only if demographers and support staff are made sufficiently aware of the benefits to be gained and are familiar with the techniques employed to accept what may generally be considered as an intrusion of a foreign discipline into their accustomed field of speciality.

103. The methodologies and technologies are there and are being continuously honed to suit local conditions. It is for the countries to appreciate them and use them fully in order to optimize the drawing of information and implications from the data and disseminate the findings expeditiously for the use of planners, policy makers and programme managers in social, economic and regional development strategies.

ANNEX T
DATES OF POPULATION CENSUSES IN AFRICA

Country	Date of previous censuses	Date of next census
Algeria	April 1966, February 1977, March 1987	1997 P
Angola	1950, 1960, December 1970, 1983	1993 P
Benin	March 1979	1990 P
Botswana	1946, 1956, 1964, August 1971, August 1981	1991 P
Burkina Faso	December 1975, December 1985	1991 P
Burundi	August 1979	1990 P
Cameroon	April 1976, April 1987	1997 P
Cape Verde	1950, 1960, December 1970, June 1980	1990 P
Central African Republic	December 1975, December 1988	1998 P
Chad	------	1991 P
Comoros	1958, September 1966, September 1980	1990 P
Congo	February 1974, December 1984	1994 P
Cote d'Ivoire	April 1975, March 1988	1998 P
Djibouti	1960/61, January 1983	1993 P
Egypt	1882, 1897, 1907, 1917, 1927, 1937, 1947, 1960, 1966, November 1976, November 1986	1996 P
Equatorial Guinea	1950, 1960, 1965, July 1983	1994 P
Ethiopia	May 1984	1994 P
Gabon	1960/61, May 1970, August 1980	1990 P
Gambia	1901, 1901, 1901, 1911, 1921, 1931, 1963, April 1973, April 1983	1993 P
Ghana	1891, 1901, 1911, 1948, 1960, March 1970, March 1984	1994 P

P- Planned date of next census
E- Expected date of next census

DATES OF POPULATION CENSUSES IN AFRICA

Guinea	December 1972, February 1983	1993 E
Guinea Bissau	December 1979, April 1979	1990 P
Kenya	1948, 1962, August 1969, August 1979, August 1989	1999 E
Lesotho	1875, 1891, 1904, 1911, 1921, 1936, 1946, 1956, April 1966, April 1976, April 1986	1996 E
Liberia	1962, February 1974, February 1984	1994 E
Libya	1931, 1936, 1954, 1964, July 1973, August 1984	1994 E
Madagascar	January, April/August 1975	1990 P
Malawi	1901, 1911, 1921, 1931, 1945, August 1966, September 1977, September 1987	1997 E
Mali	December 1976, April 1987	1997 E
Mauritania	January 1977, April 1988	1999 E
Mauritius	1846, 1851, 1861, 1871, 1881, 1901, 1911, 1921, 1931, 1944, 1952, June 1972, July 1983	1990 P
Morocco	1960, July 1971, September 1982	1992 E
Mozambique	1940, 1950, 1960, September 1970, August 1980	1990 P
Niger	November 1977, May 1988	1999 E
Nigeria	1911, 1921, 1931, 1953, 1963, November 1973	1991 P
Rwanda	August 1978	1991 P
Sao Tome & Principe	1950, 1960, September 1970, August 1981	1991 P

P- Planned date of next census
E- Expected date of next census

DATES OF POPULATION CENSUSES IN AFRICA

Senegal	April 1976 May/June 1988	1996 P
Seychelles	1931 1871 1971 1947 1960 May 1971 Summer 1977 Summer 1981	1987 P
Sierra Leone	April 1963 December 1974 December 1985	1995 P
Somalia	February 1975 November 1985	1995 P
Sudan	1955/56 April 1973 February 1983	1993 P
Swaziland	1956 1974 1931 1937 1956 1966 1984 May 1986 Summer 1976 Summer 1994	1996 P
Tanzania, United Rep. of	1948 1957 1967 Summer 1967 Summer 1978 Summer 1988	1998 P
Togo	1958/61 March April 1970 November 1981	1991
Tunisia	1931 1936 1941 1946 1956 1966 May 1966 May 1975 March 1984	1994 P
Uganda	1911 1931 1948 1959 Summer 1969 January 1980	1990 P
Zaire	July 1984	1994 P
Zambia	1956 Summer 1969 Summer 1980	1990 P
Zimbabwe	1969 May 1982 August 1992	1992 P

P= Planned date of next census
E= Expected date of next census

ANNEX II: Topics canvassed during 1980 round of African censuses (Basic demographic characteristics)

Topics	Country											
	ALG	ANG	BEN	BOT	BVF	BDI	CAM	CVI	CAF	COI	PRC	TVC
Census year	'77	'83	'79	'81	'75	'79	'76	'80	'75	'80	'84	'75
Relationship to Hd/Hse	X	X	X	X	X	X	X	X	X	X	X	X
Marital status	X	X	X	X	X	X	X	X	X	X	X	X
Age at marriage												
Duration of mar										X		
No. of wives										X		
Children ever-born	X	X		X			X	X	X	X	X	
Children living/dead	X	X		X			X	X	X	X	X	
Most recent birth/ birth last year		X		X			X	X	X	X	X	
Survival of parent/ last birth		X					X	X		X		
Parent survival		X								X		
Spouse survival												
Deaths in hh				X			X			X	X	
Disability												
physical status										X		
Residence status	X	X			X	X	X			X	X	X
Place of birth	X	X	X		X	X	X	X	X	X	X	X
Ethnic/tribe/ nationality	X	X	X			X	X	X	X	X	X	X
Citizenship				X								
Place of res.	X											
Usual residence				X			X	X				
Prev. residence	X		X				X		X			
Dur of residence	X	X	X				X		X	X	X	
Res at specified time in past	X	X		X	X			X		X	X	
Place of work/study	X											

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Topics	Country											
	BUT	BDI	COM	ETH	GAB	GAM	GNB	GUI	GNS	KEN	LBR	LSO
Census year	'83	'78	'83	'84	'80	'83	'84	83	'78	'79	'86	'86
Relationship/Sex/Eth.	X	X	X	X	X	X	X	X	X	X	X	X
Marital status	X	X	X	X	X	X		X	X	X	X	X
Age at marriage												
Duration of mar.	X	X										
No.of wives		X										
Children ever born	X	X	X	X	X	X				X	X	X
Children living/dead	X	X	X	X	X	X				X	X	X
Most recent birth/												
birth past year	X		X	X	X	X		X		X	X	X
Survival of parents/												
last birth	X		X	X		X		X			X	
Parent survival	X					X				X		X
Spouse survival												
Deaths in hh	X			X	X			X			X	X
Disability:												
physical status		X		X								
Residence status	X			X	X	X	X	X	X		X	X
Place of birth	X	X	X	X	X	X	X	X	X	X	X	X
Ethnic/tribal												
nationality	X	X	X	X	X	X	X	X	X	X	X	X
Citizenship											X	X
Place of res	X					X	X				X	
Usual residence	X		X			X	X					
Prev. residence	X										X	
Dur.of residence	X	X		X							X	X
Res. at specified												
time in past	X	X	X							X		
Place of work/study		X										

Topics	Country											
	LIB	MAG	MAS	MLT	MZM	MAR	MOR	MOZ	NEP	PHL	STP	SAM
Census year	'84	'75	'77	'76	'77	'83	'82	'80	'77	'78	'81	'76
Relationship/Sex/Age	X	X	X	X	X	X	X	X	X	X	X	X
Marital status	X	X	X	X	X	X	X	X	X	X		X
Age at marriage/												
Duration of mar.						X						
No.of wives			X									
Children ever born	X		X		X	X	X	X		X		
Children living/dead	X		X		X	X	X	X		X		
Most recent birth/												
birth past year			X	X	X	X	X	X		X	X	
Survival of recent/												
last birth				X	X	X	X	X		X		
Parent survival			X									
Spouse survival												
Deaths in HH	X		X	X				X		X	X	
Disability												
physical status	X	X										
Residence status	X	X		X	X		X	X	X	X		X
Place of birth	X	X	X	X	X		X		X	X	X	X
Ethnic/tribal/												
nationality	X	X	X	X	X		X	X	X	X	X	X
Citizenship									X			
Place of res.					X		X	X				X
Usual residence						X		X				
Prev.residence	X				X		X					
Dur.of residence	X	X			X		X		X			
Res. at specified/												
time in past	X		X			X	X	X				
Place of work/study						X						

Topics

Country

Census year	SEY '77	SOM '75	SUD '83	SWA '76	WEST '79	TOG '81	TUN '75	UGA '80	ZAI '84	ZAM '80	ZIM '82	TOT 27
Relationship/Sex/Age	X	X	X	X	X	X	X	X	X	X	X	27
Marital status		X	X		X	X	X	X	X	X	X	23
Age at marriage/ Duration of mar.			X				X			X		7
No.of wives												3
Children everborn	X	X	X	X	X		X		X	X	X	23
Children living/mean		X	X	X	X		X		X	X	X	20
Most recent birth/ birth past year	X	X	X	X	X	X			X	X	X	23
Survival of recent last birth			X	X						X	X	20
Parent survival			X	X	X				X		X	17
Spouse survival					X							1
Deaths in hh		X				X						18
Disability/ physical status						X			X	X		8
Residence status	X			X		X	X	X	X			22
Place of birth		X	X	X	X	X	X	X	X	X	X	24
Ethnic/tribe/ nationality	X		X	X		X	X	X	X	X	X	24
Citizenship										X		5
Place of res.	X						X					11
Usual residence		X	X									11
Prev.residence							X				X	11
Dur.of residence			X				X		X	X		21
Res.at specified time in past					X	X	X			X		20
Place of work/study												9

Micro computer software available for data evaluation and analysis

A. Data evaluation and adjustment

1. ADJAGE	7. CRUCT	13. EYEMT
2. AGESX	8. LOGISTIC	14. RAKEBIO
3. BEERS	9. MAPLOT	15. SPREDSTAT
4. BP5	10. MLTE	16. SMOTH
5. BP10	11. MOVEPOP	17. UNISMH
6. BPSTRG10	12. MUHM	

B. Mortality analysis

1. BESTPT	6. LOGITLX	11. ORPHAN
2. CEBCS	7. LTABPEAN	12. PREBC
3. FWDFV	8. LT-BRTH/STH/UST	13. SURVI
4. INCHM	9. MLOGIT	14. TUOCH
5. LIFTB	10. QUECH	15. UNIBR

C. Mortality and Fertility analysis

1. ARFE-2	6. MARM-MAT	9. RATE
2. ASFRPATC	7. MASE	10. TFR (CEB)
3. FERTCB	8. RATMORE	11. TFR (CEP)
4. FERTPF	9. REPAR	

D. Population distribution and Migration analysis

1. ARCINFO	3. MATTON	
2. MAPINFO	4. UNTMIG	

E. Population projections

1. DEMPROJ
2. PEOPLE
3. POPTLO
4. POPPOJ

F Population Models

1. BRAGRGR
2. THISTP
3. PRESTO

Micro-computer software available for data evaluation and analysis

A. Data evaluation and adjustment

1. ADJAGE	7. CENCT	13. PYRMT
2. ACESX	8. LOCTSTTC	14. RAPFACT
3. BEERS	9. MAPLOT	15. SEASONAL
4. BP5	10. MLPE	16. SMOTH
5. BP10	11. MOVEPOP	17. WISMW
6. BPSTPRGM	12. MORM	

B. Mortality analysis

1. BESTFT	6. LOGTRLX	11. ORPHAN
2. CEBCS	7. LTABRAN	12. PERPC
3. FWDPV	8. LT-NRTH/STH/WST	13. STRVT
4. INCHM	9. MLOGIT	14. TIMCH
5. LIFTB	10. OMEGA	15. TRABB

C. Nuptiality and fertility analysis

1. ARFE-2	6. MARM-MLT	9. PPLF
2. ASFRPATT	5. MARF	10. TFR (CBR)
3. FERTCB	7. PATMORF	11. TMR (CBF)
4. FERTPF	8. RERAP	

D. Population distribution and migration analysis

1. ARCINFO	3. MATTOM
2. MAPINFO	4. NETMIG

E. Population projections

1. DEMPROJ
2. PEOPLE
3. PORTLO
4. PORPOJ

F. Population Models

1. BRAGRGB
2. TUSTP
3. BRESTO